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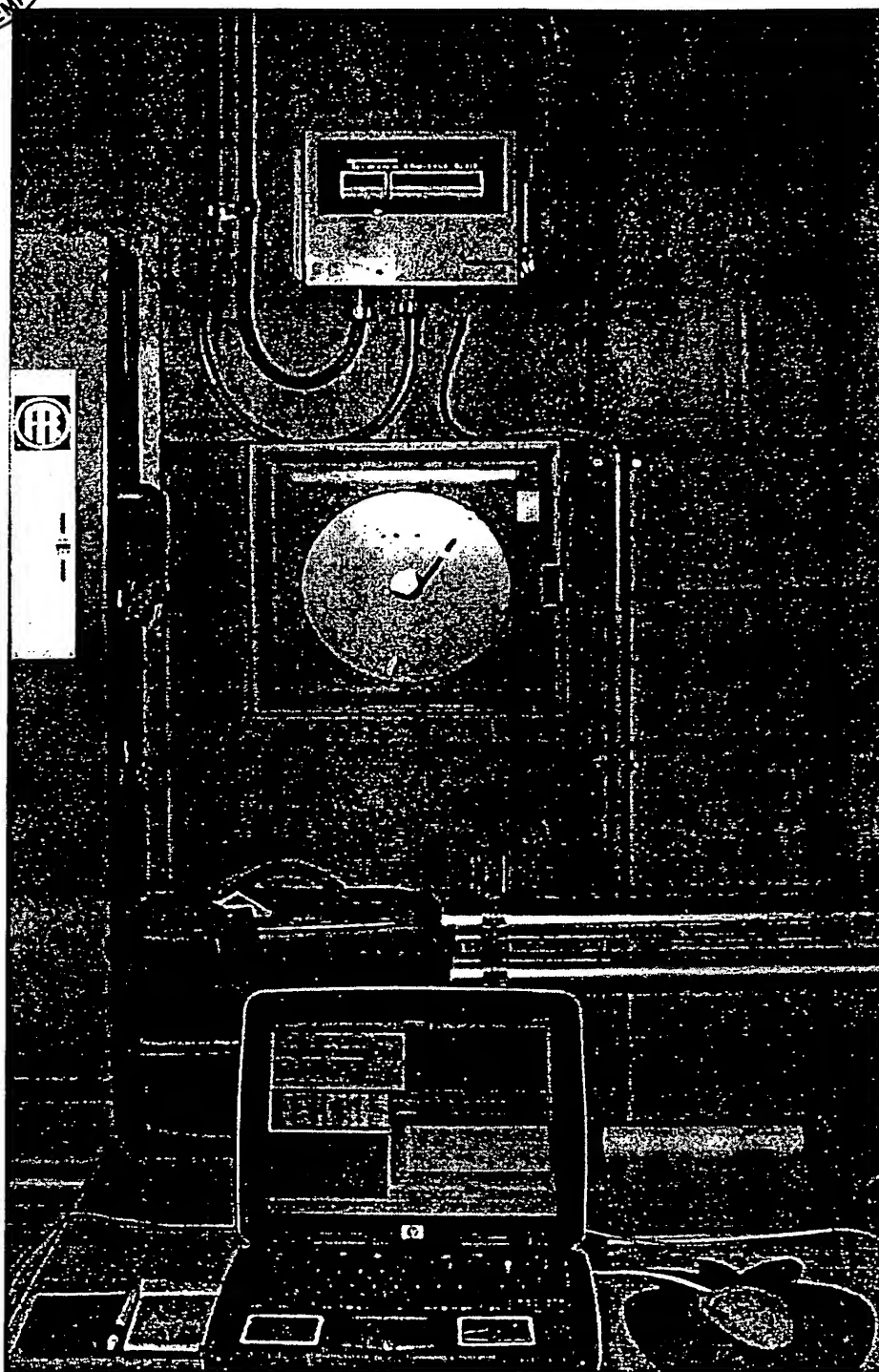
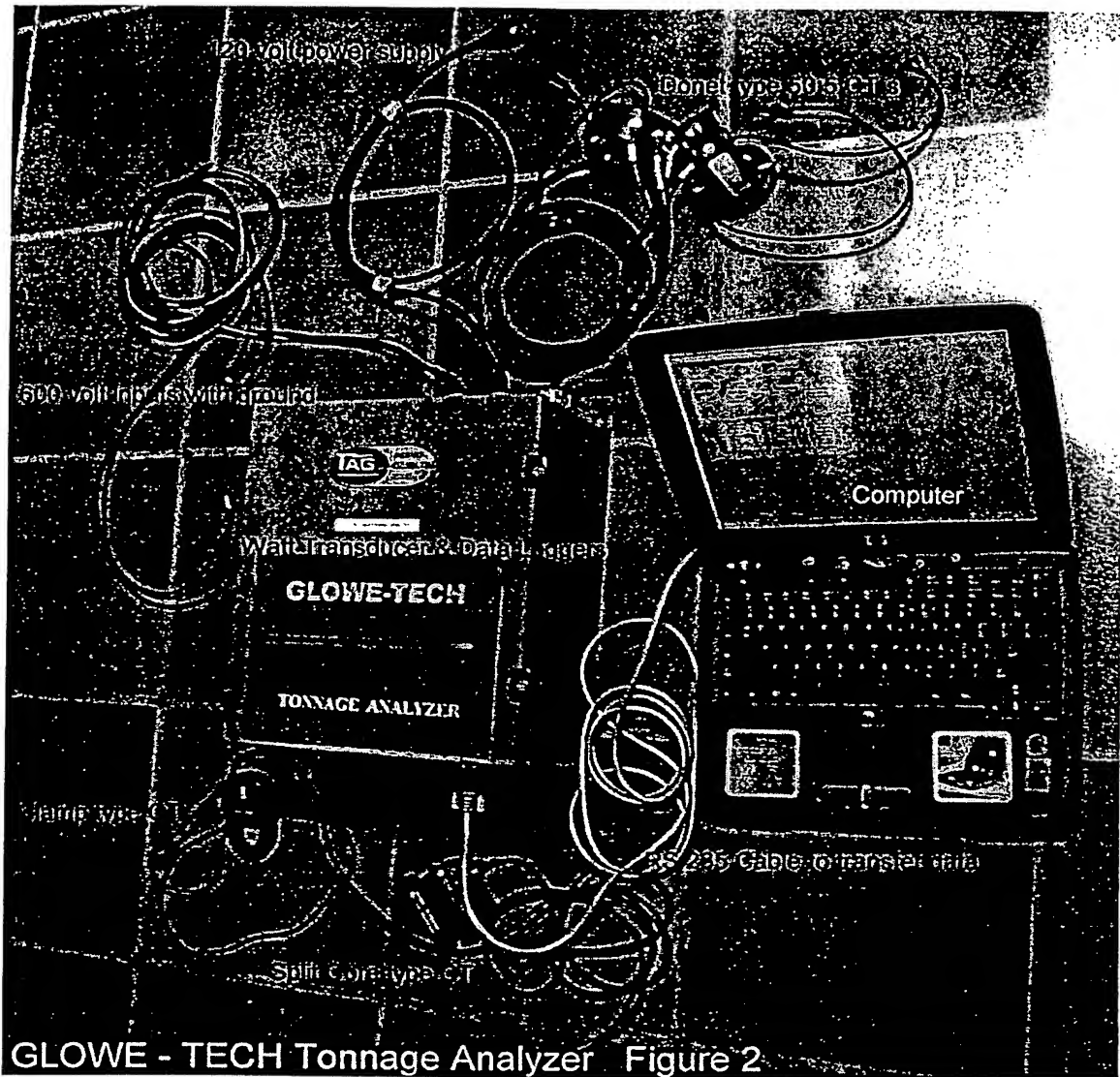


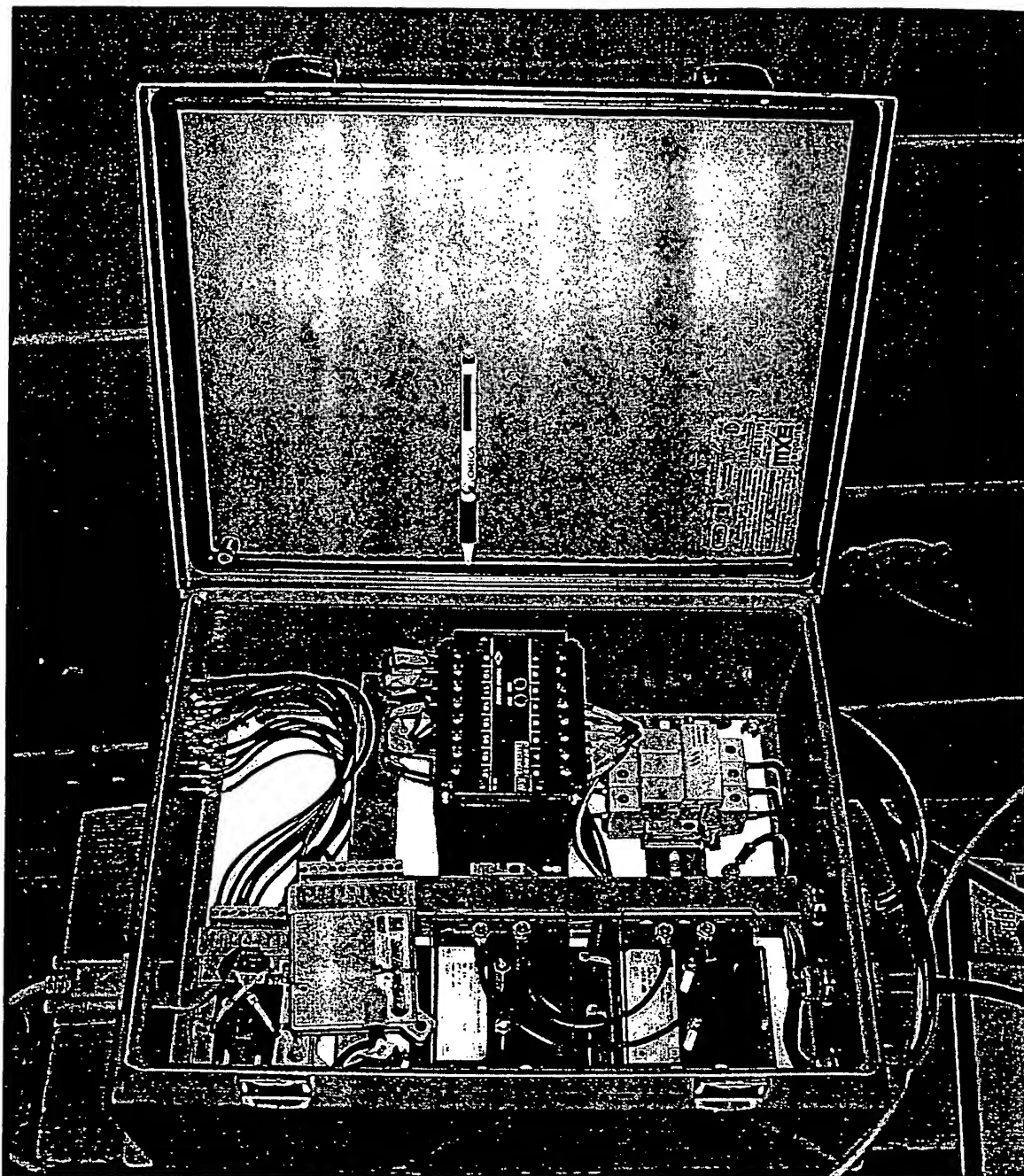
FIGURE 1

Typical set-up with computer recording live data converted to tonnage with belt scale monitor (top unit) showing actual tonnage moving over conveyor

**FIGURE: 2**



- Item 1: 600 volt input wires for line 1, 2 & 3 for watt transducer & ground wire
- Item 2: Donut type 50:5 CT's for current input to watt transducer
- Item 3: 120 volt power supply wire for watt transducer
- Item 4: Clamp type CT for ampere method to collect data for tonnage conversion
- Item 5: Split-Core CT for ampere method to collect data for tonnage conversion
- Item 6: Instrument case with Watt Transducer installed
- Item 7: Instrument case with ACR Data logger installed
- Item 8: RS235 Cable to transfer data to computer
- Item 9: Lap-top computer to collect data
- Item 10: Screen showing live data and for display of Real-Time graph of data in Tonnes converted from kilowatts or amps



**FIGURE 3:**

**GLOWE-TECH Tonnage Analyzer – Portable model with 2 Data Loggers capable of monitoring up to a total of 14 conveyor motors**

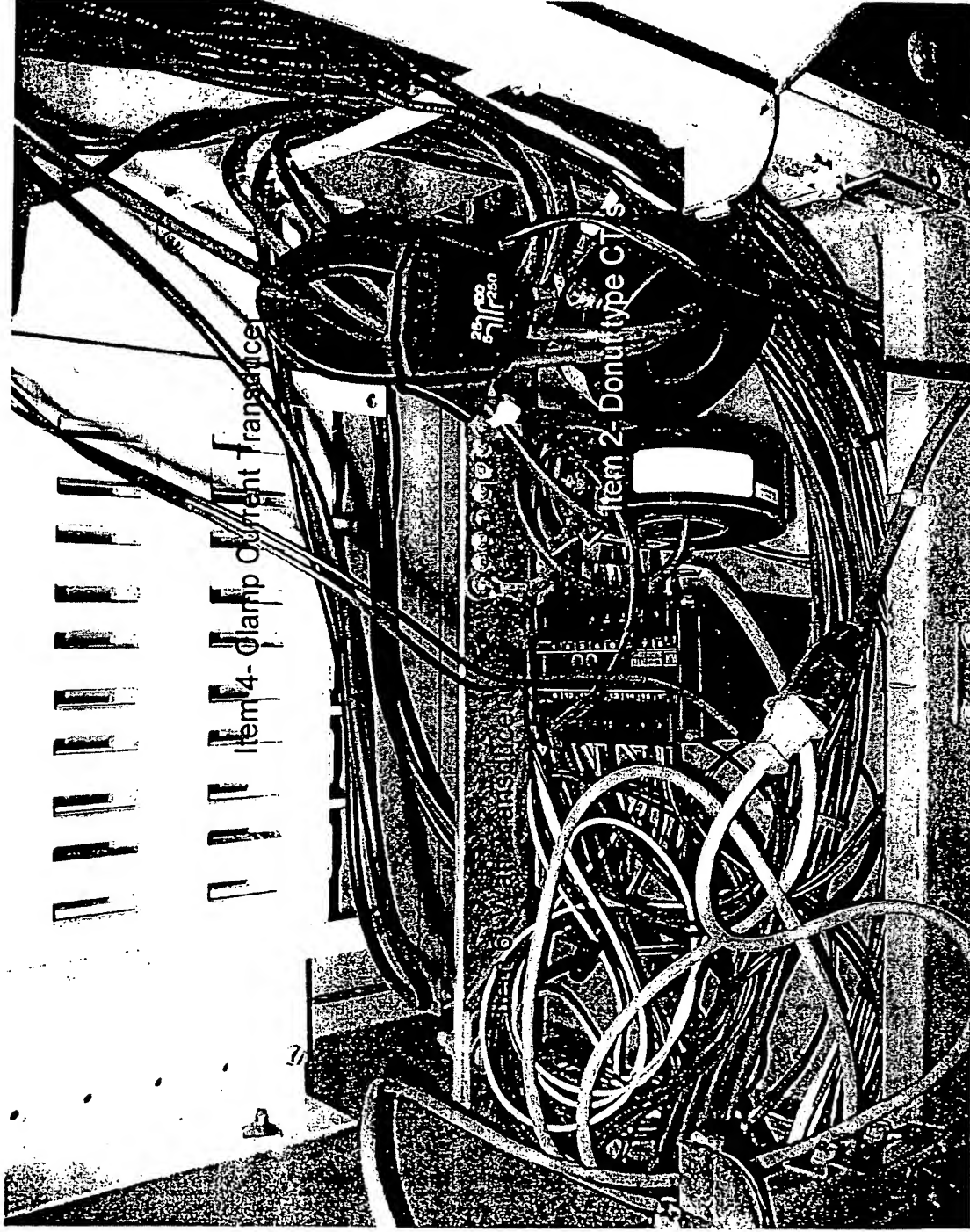
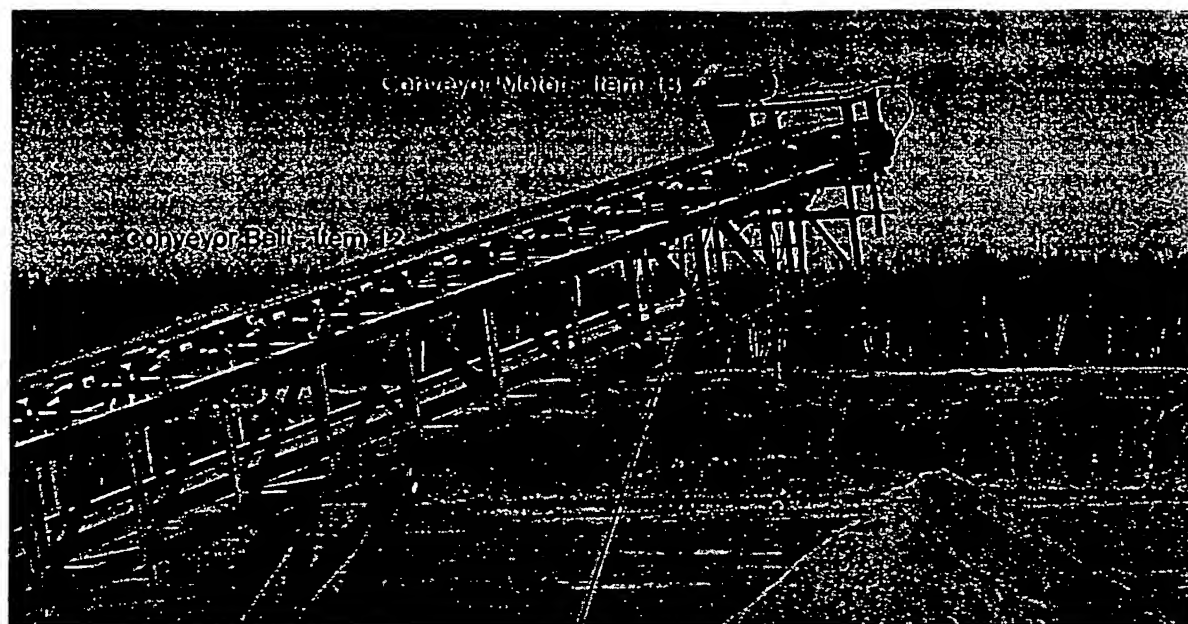
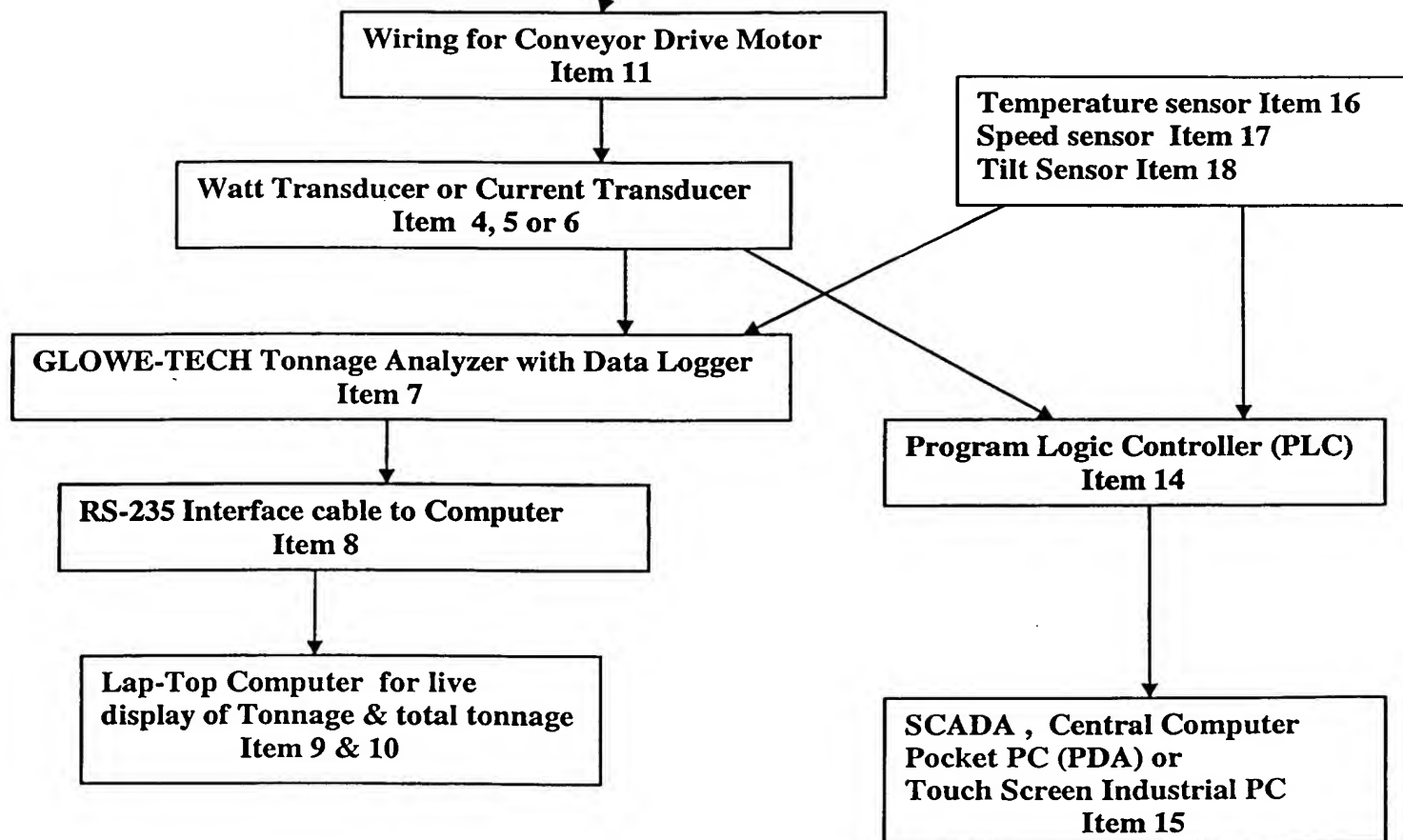


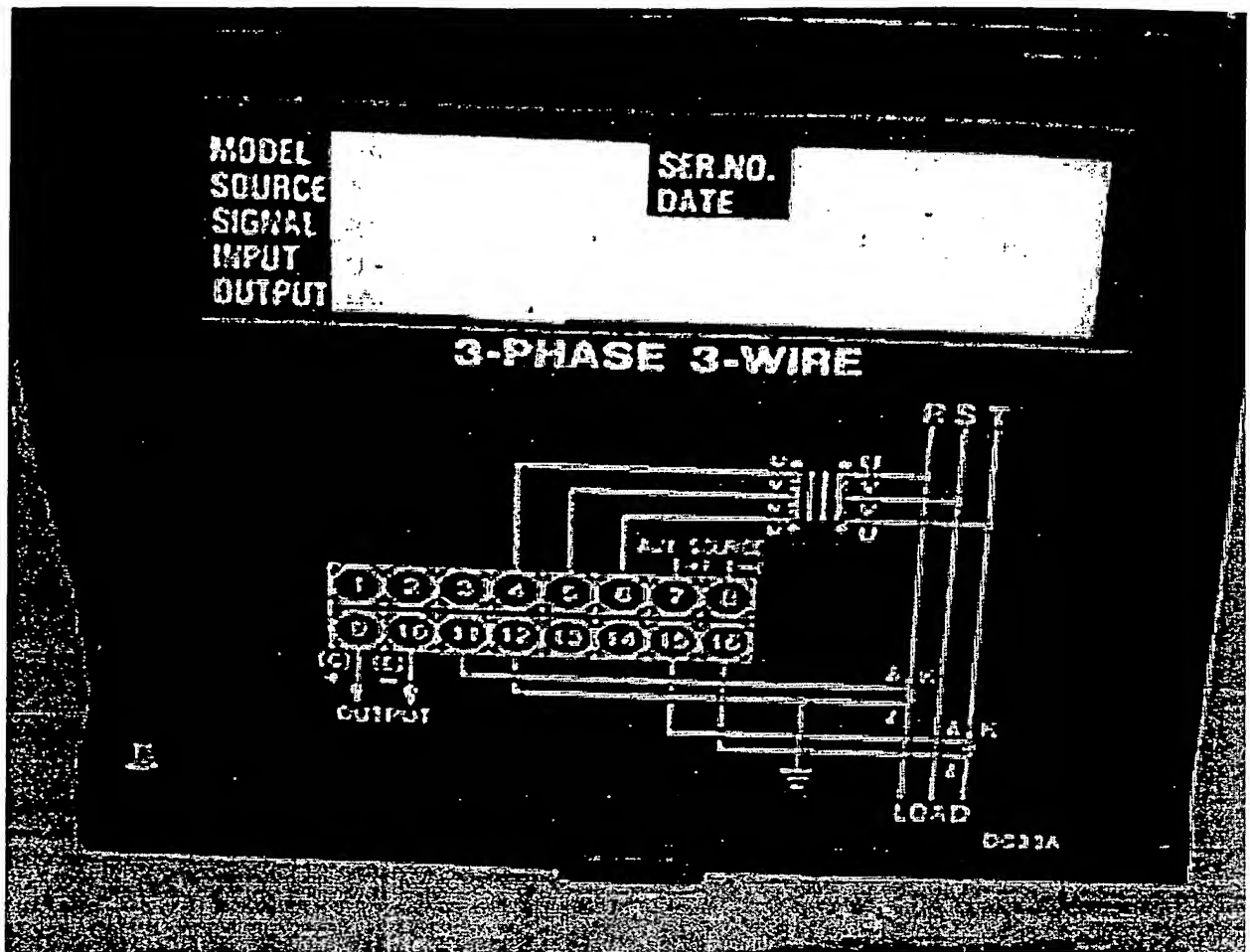
FIGURE 3b: Watt Transducer installation for Typical Conveyor Motor showing Clamp CT installed too



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**FIGURE: 4 Schematic of Typical Conveyor Belt Motor Tonnage Conversion**

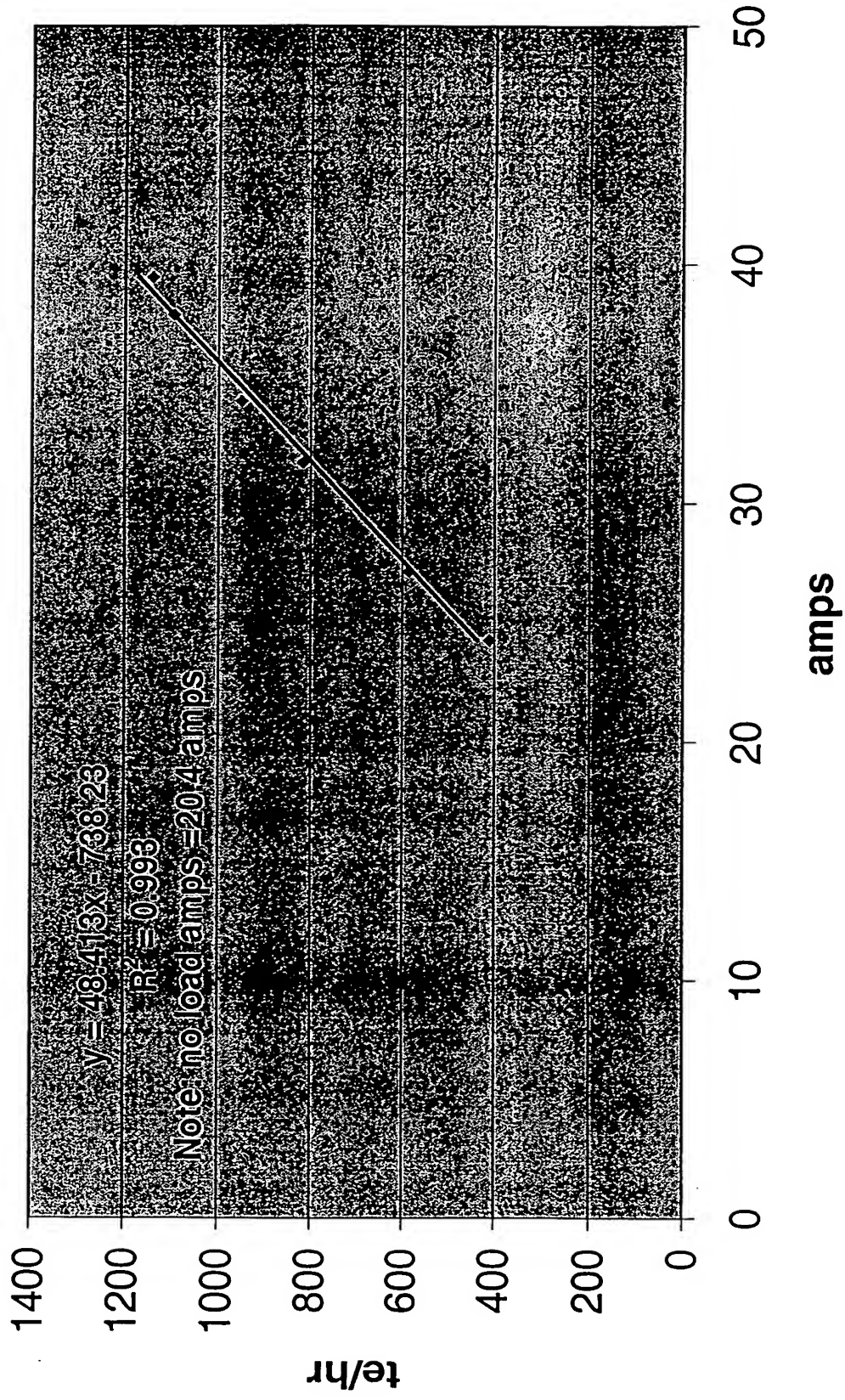


**FIGURE: 5**

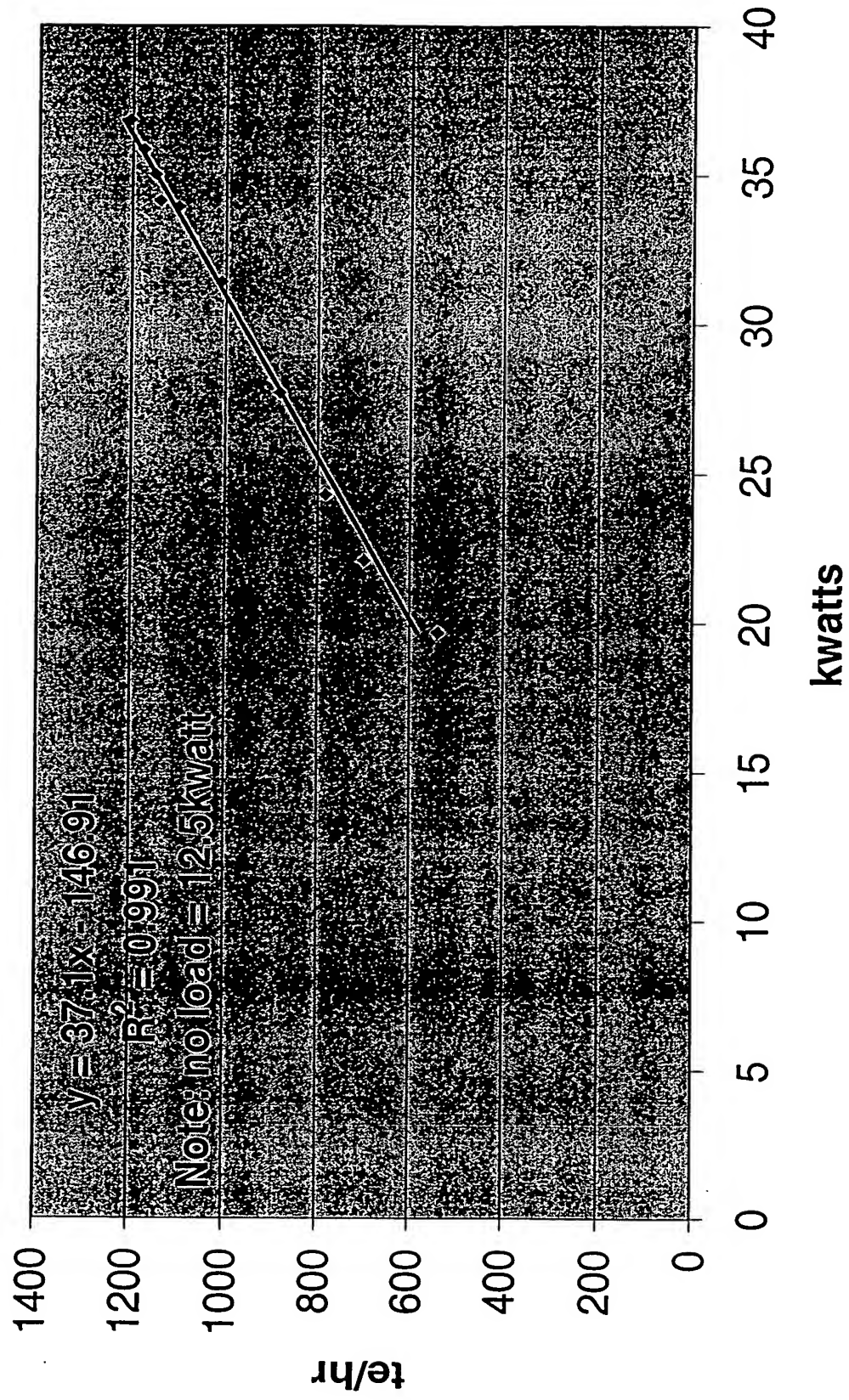
**GLOWE-TECH Typical wiring diagram for Watt Transducer**



Graph amps to tonnes Figure: 6



Kwatts to tonnes Figure 7





**FIGURE: 8**

**Summary of Tonnage for Typical Conveyor using kwatts to tonnes**

<b>Date</b>	<b>Truck Count</b>	<b>actual Belt Scale tonnes</b>	<b>Corrected Belt Scale tonnes</b>	<b>kwatts conversion to tonnes</b>	<b>difference tonnes</b>	<b>amps conversion to tonnes</b>	<b>difference tonnes</b>
15-Apr	126	6474.10	6474.10	6470.914	3.19	0	0
16-Apr	185	9552.40	9552.40	9404.079	148.32	9676.29	-123.89
17-Apr	145	7730.90	7730.90	7499.33	231.57	7753.309	-22.41
18-Apr	180	9451.50	9539.50	9412.356	127.14	9638.428	-98.93
19-Apr	166	8560.00	8665.00	8553.628	111.37	8737.455	-72.45
22-Apr	173	9138.00	9386.15	9447.105	-60.96	9465.383	-79.24
23-Apr	197	10453.00	10692.49	10717.322	-24.84	10323.369	369.12
24-Apr	159	7982.00	7982.00	8125.574	-143.57		
25-Apr	163	3705.00	3738.90	3773.876	-34.98		
26-Apr	164	8537.00	8757.00	8933.782	-176.78		
29-Apr	149	8150.00	8346.70	8418.175	-71.47		
30-Apr	156	8272.00	8482.00	8504.899	-22.90		
1-May	191	9901.00	10123.00	10138.142	-15.14		
2-May		10552.90	10758.00	10777.447	-19.45		
<b>TOTAL</b>		<b>118459.80</b>	<b>120228.13</b>	<b>120176.629</b>	<b>51.50</b>		

**NOTE: Belt Scale tonnage was corrected for tonnage being added from April 18 to April 24th then taking off tonnage due to removal of rock end April 24 which had fallen on belt scale**

**NOTE: Apr 24 to May 2 scale was taking tonnes from scale display at 15 to 25 te/hr**

**NOTE:kwatt calibration formula used as per graph is  $37.1x - 146.91$  for all readings April 15 to May 2**

**NOTE: Amp calibration formula used as per graph is  $48.413x - 738.13$  for all readings**

**FIGURE 8b**

Comparison Table showing difference in GLOWE-TECH Tonnage Analyzer Readings with Milltronics Belt Scale Readings

Date	Operating Time hours	No-Load time hours	Start-Up time hours	Production time-hours	Milltronics tonnes	GT Analyzer tonnes	Difference tonnes	difference %
6-May-02	7.367	1.813	0.064	5.490	2830.000	2769.730	60.270	2.13
7-May-02	10.930	2.176	0.196	8.558	4374.000	4377.165	-3.165	-0.07
8-May-02	7.117	1.796	0.027	5.294	2791.000	2776.820	14.180	0.51
9-May-02	6.830	1.187	0.116	5.527	3119.500	3096.503	22.997	0.74
10-May-02	10.650	1.242	0.044	9.364	4494.000	4531.777	-37.777	-0.84
13-May-02	10.430	7.158	0.007	3.265	1845.900	1888.235	-42.335	-2.29
14-May-02	8.817	5.402	0.031	3.384	1866.000	1866.000	0.000	0.00
15-May-02	10.867	1.502	0.080	9.285	4659.000	4680.243	-21.243	-0.46
16-May-02	11.033	2.380	0.011	8.642	4563.000	4582.861	-19.861	-0.44
17-May-02	9.067	1.620	0.009	7.438	3799.000	3761.421	37.579	0.99
20-May-02	8.967	1.389	0.009	7.569	3792.000	3791.384	0.616	0.02
21-May-02	10.883	1.778	0.009	9.096	4226.000	4199.993	26.007	0.62
22-May-02	10.750	1.620	0.138	8.992	3925.000	3921.740	3.260	0.08
23-May-02	7.880	1.311	0.009	6.560	3261.000	3206.395	54.605	1.67
<b>TOTAL</b>	<b>131.588</b>	<b>32.374</b>	<b>0.750</b>	<b>98.464</b>	<b>49545.400</b>	<b>49450.267</b>	<b>95.133</b>	

Note: Data taken from a conveyor belt feeding a secondary crusher.

Note: Potential of up to 33.124 hours of new production available in recording period.

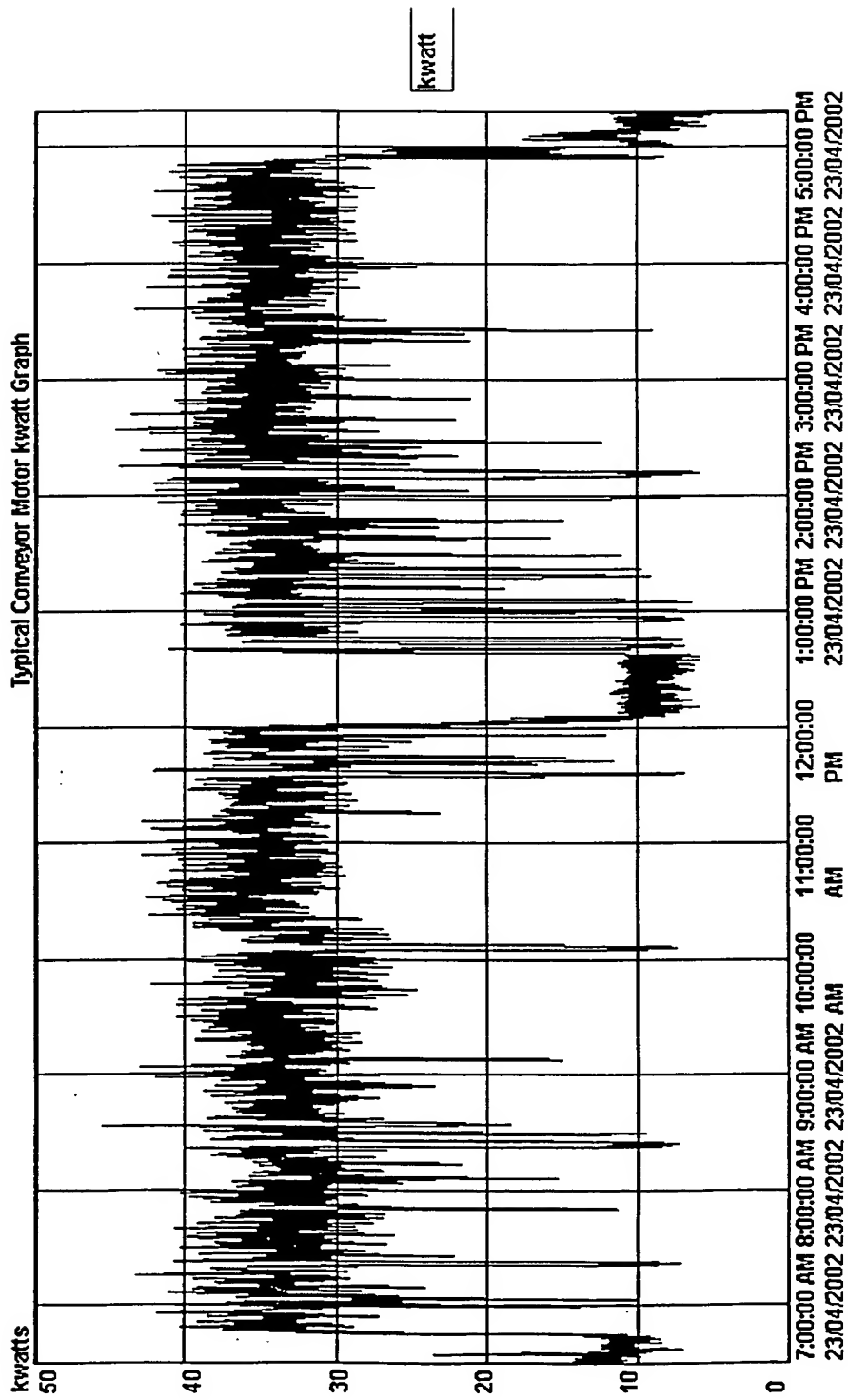


FIGURE: 9 kilowatt graph

## TYPICAL Quarry Kwatts Converted to Tonnage Summary report

Temperature am	10.000	Degrees Celcius
Temperature pm	17.000	Degrees Celcius
No load kwatt =	13.600	
Start up kwatts =	21.000	
Time No-Load kwatt	134.533	mlnutes
Time Start-Up kwatts	1.067	mlnutes
Total Production time	11.676	hours
Average kwatt for day	17.308	kwatts
Average Tonnage by formula	555.233	te/hr
Actual Scale Reading	5263.000	tonnes
Total tonnage by GT analyzer = difference	5237.943	tonnes
	-25.057	
	5237.696	tonnes totalized
	-25.3040	tonnes
Time of data Reading	Count	tonnes/hour on conveyor
28/02/2003 6:00:05	No-Load	Count
28/02/2003 6:00:13	Over-load	Count
28/02/2003 6:00:21	Over-load	Count
Break	Count	Count
28/02/2003 17:39:17	Count	Count
28/02/2003 17:39:25	Count	Count
28/02/2003 17:39:33	Count	Count
28/02/2003 17:39:41	Count	Count
28/02/2003 17:39:49	Count	Count
28/02/2003 17:39:57	Count	Count
28/02/2003 17:40:05	Count	Count
28/02/2003 17:40:13	Count	Count
28/02/2003 17:40:21	Count	Count
28/02/2003 17:40:29	Count	Count

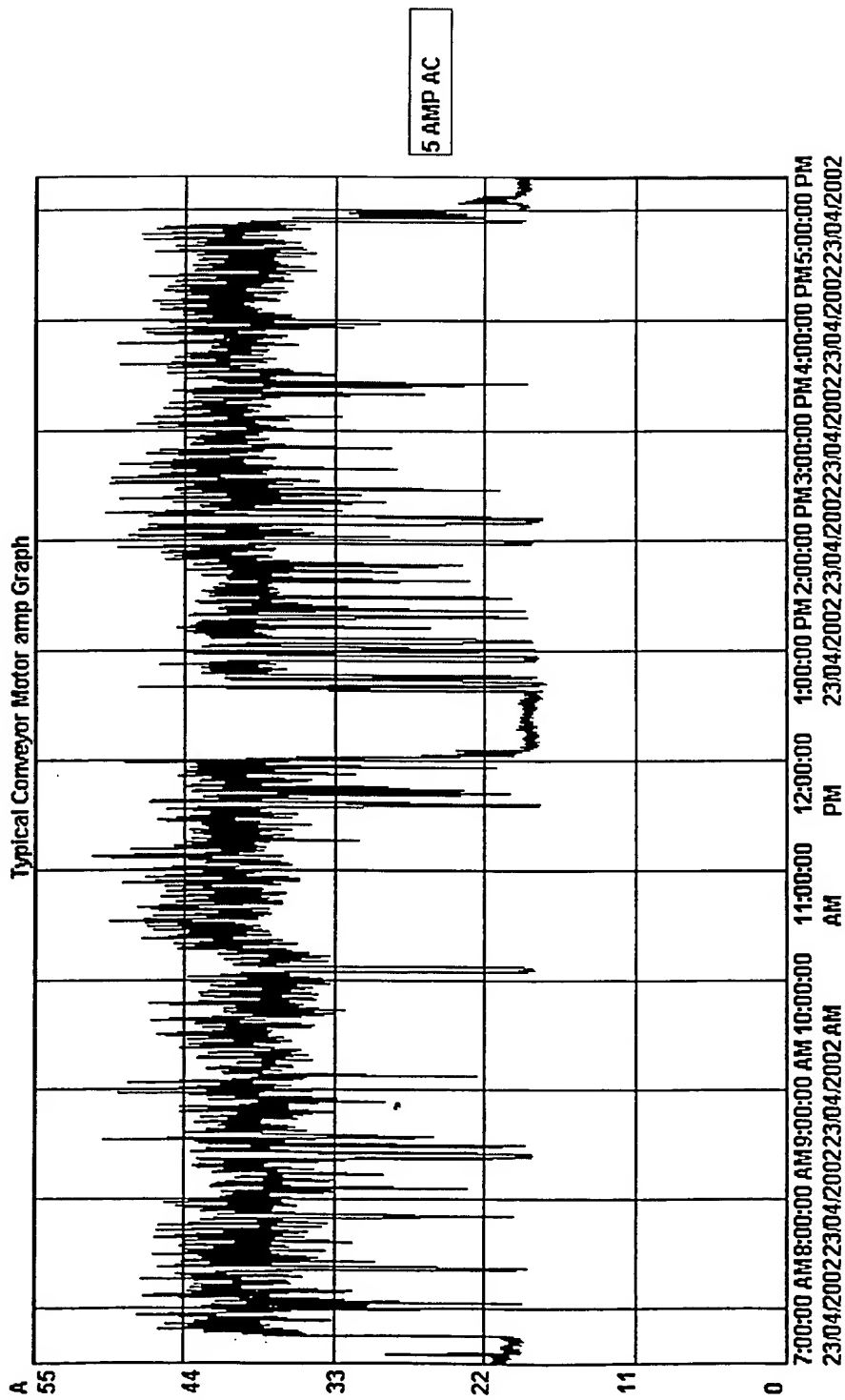


FIGURE: 11 amp Graph

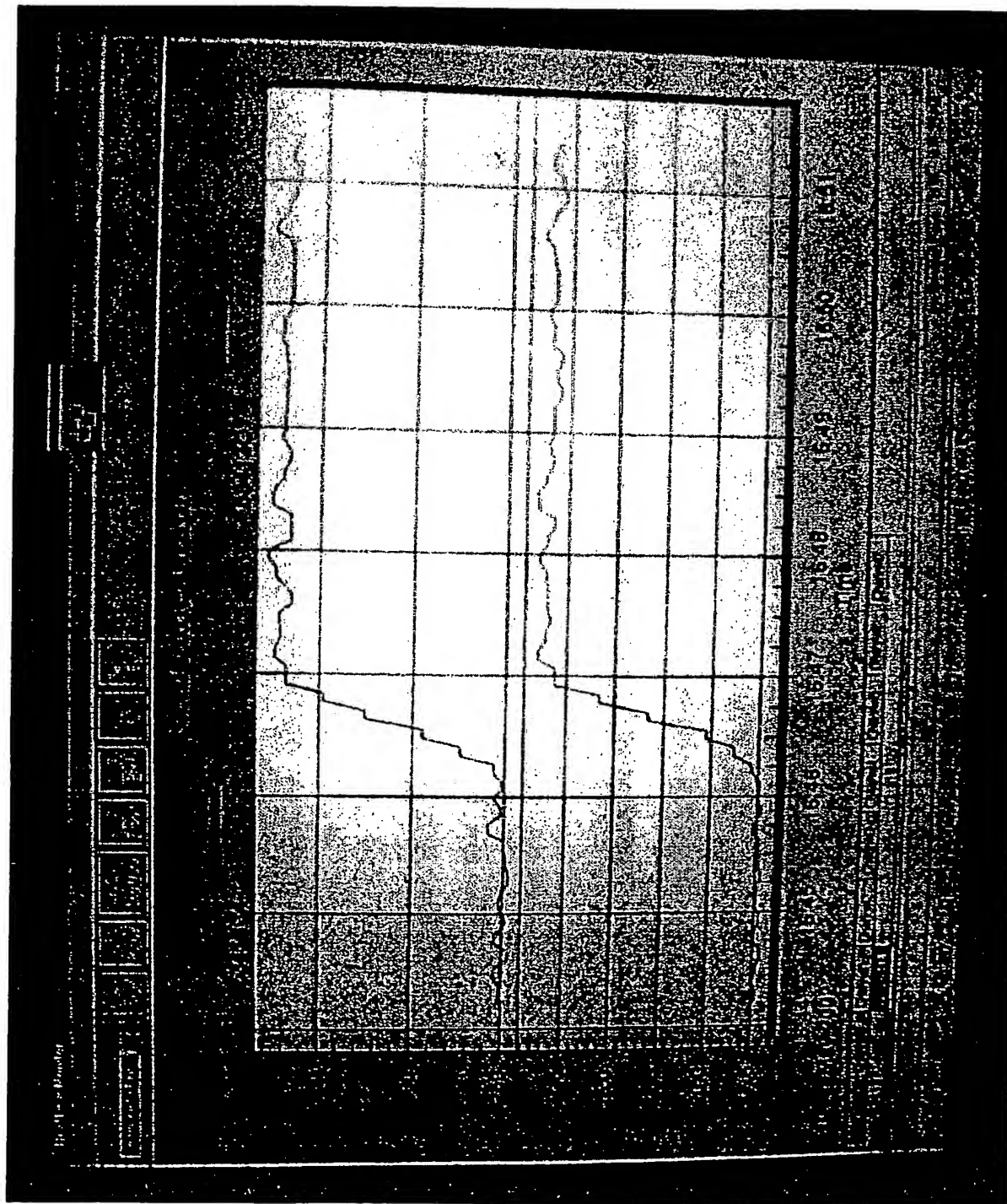
# TYPICAL Quarry Amps to tonnage Summary

FIGURE 12

Temperature	am	9.000	degrees C
Temperature	pm	15.000	degrees C
		25.000	
		80.000	
Time no load amps	69.33 minutes	1.156 hours	
Time at start-up amps	5.87 minutes	0.098 hours	
Total Recording Time	11.709 hours	10.553	total hr production
Average current for day =	66.787	amps	
Average Tonnage by formula =	496.592	tonnes	
Total tonnes by Instrument	5240.756	tonnes	
Total tonnes by scale	5184.000	tonnes	
Difference	-56.756 tonnes		
		5240.7003 tonnes totalized	
		-56.700 tonnes	

Time of reading	Actual Amps	Count no load	Count no startup	Count >	Conditioned Amps	Tons/hour on conveyor	Tons/hr on conveyor
12/02/2003 6:00:04	20.30774	1	0	0			
12/02/2003 6:00:12	20.26378	1	0	0			
12/02/2003 6:00:20	20.26378	1	0	0			
BREAK							
12/02/2003 17:41:00	60.22648	0	0	0	60.226	428.974	0.9533
12/02/2003 17:41:08	59.25929	0	0	0	59.259	419.006	0.9311
12/02/2003 17:41:16	60.71008	0	0	0	60.710	433.959	0.9644
12/02/2003 17:41:24	60.00667	0	0	0	60.007	426.709	0.9482
12/02/2003 17:41:32	56.31374	0	0	0	56.314	388.646	0.8637
12/02/2003 17:41:40	52.79667	0	0	0	52.797	352.395	0.7831
12/02/2003 17:41:48	46.77369	0	0	0	46.774	290.316	0.6451
12/02/2003 17:41:56	42.99284	0	0	0	42.993	251.347	0.5585
12/02/2003 17:42:04	37.45346	0	0	0	37.453	194.253	0.4317
12/02/2003 17:42:12	32.52956	0	0	0	32.530	143.502	0.3189
12/02/2003 17:42:20	27.60566	0	0	0	27.606	92.752	0.2061
12/02/2003 17:42:28	24.57219	1	0	0			





**FIGURE 13a:** - Typical Real Time Graph showing te/hr converted from Watt Transducer and a Real Time Graph of Amperage readings from the same Conveyor motor for parallel conversion to Tonnage for demonstration purposes.

File Edit View Insert Format Tools Data Window Help										
A	B	C	D	E	F	G	H	I	J	K
1	Typical Daily conversion kilowatts to tonnes Aug 5, 2003									
2							Calibration Formulas			
3							655.406 Ideal Formula Number			
4	No load kwatt						590.903 01/08/2018 formula 1			
5	Peak kwatts	Motor					631.737 01/09/2015 formula 2			
6	Time No-Load kwatt	10.667 minutes					652.916 Jun 20.03 Formula 3	currently used		
7	Time Start-Up kwatts	0.000 minutes								
8	Total Production time	3.536 hours								
9	Average kwatt for day	Motor					No-Load Original reading	7.300 kwatts		
10	Average Tonnage by formula						New No-Load reading	7.403 kwatts		
11							649.772 New Formula	-0.103 kwatts difference		
12	Tonnage by belt scale						2201.000 tonnes est			
13	Total tonnage by GT analyzer =						2182.077 tonnes			
14	Difference						18.923 tonnes			
15	Percentage difference						0.860 %			
16	Time of data Reading	Actual kwatt Reading	Count	Count	Conditioned kwatt	tonnes/hr on conveyor	No-Load Time	No-Load Reading		
17	05/08/2003 6:16:26	-0.07618	1	0	0	10.842	179.824	7.03132	6.965 Average kv	
18	05/08/2003 6:16:34	10.84231	0	0	0	10.842	179.824	7.12659	0.293 Std dev	
19	05/08/2003 6:16:42	12.55725	0	0	0	12.557	231.932	7.62202	7.403 1.5 std dev	
20	05/08/2003 6:16:50	14.48180	0	0	0	14.482	290.409	6.95510	7.550 2.0 std dev	
21	05/08/2003 6:16:58	17.18760	0	0	0	17.188	372.625	6.95510		
22	05/08/2003 6:17:06	20.75088	0	0	0	20.751	480.895	7.16470		
23	05/08/2003 6:17:14	25.01919	0	0	0	25.019	610.588	7.06943		
1593	05/08/2003 9:46:34	29.17316	0	0	0	29.173	736.806	1.637		
1594	05/08/2003 9:46:42	29.02073	0	0	0	29.021	732.175	1.627		
1595	05/08/2003 9:46:50	28.52530	0	0	0	28.525	717.121	1.594		
1596	05/08/2003 9:46:58	28.54435	0	0	0	28.544	717.700	1.595		
1597	05/08/2003 9:47:06	30.27835	0	0	0	30.278	770.388	1.712		
1598	05/08/2003 9:47:14	29.34466	0	0	0	29.345	742.017	1.649		
1599	05/08/2003 9:47:22	30.41174	0	0	0	30.412	774.441	1.721		
1600	05/08/2003 9:47:30	29.49710	0	0	0	29.497	746.649	1.659		
1601	05/08/2003 9:47:38	28.08703	0	0	0	28.087	703.804	1.564		
1602	05/08/2003 9:47:46	29.36371	0	0	0	29.364	742.596	1.650		
1603	05/08/2003 9:47:54	29.30655	0	0	0	29.307	740.860	1.646		
1604	05/08/2003 9:48:02	29.11800	0	0	0	29.116	735.070	1.633		
1605	05/08/2003 9:48:10	29.19222	0	0	0	29.192	737.366	1.639		
1606	05/08/2003 9:48:18	29.00167	0	0	0	29.002	731.596	1.626		
1607	05/08/2003 9:48:26	29.38277	0	0	0	29.383	743.175	1.652		
1608			1	0	0					

Full Screen  
Close Full Screen

Figure 13b Typical Daily Summary Table with Stable No-Load reading

Microsoft Excel - Typical Cal Graph CV104 Sep 3, 03

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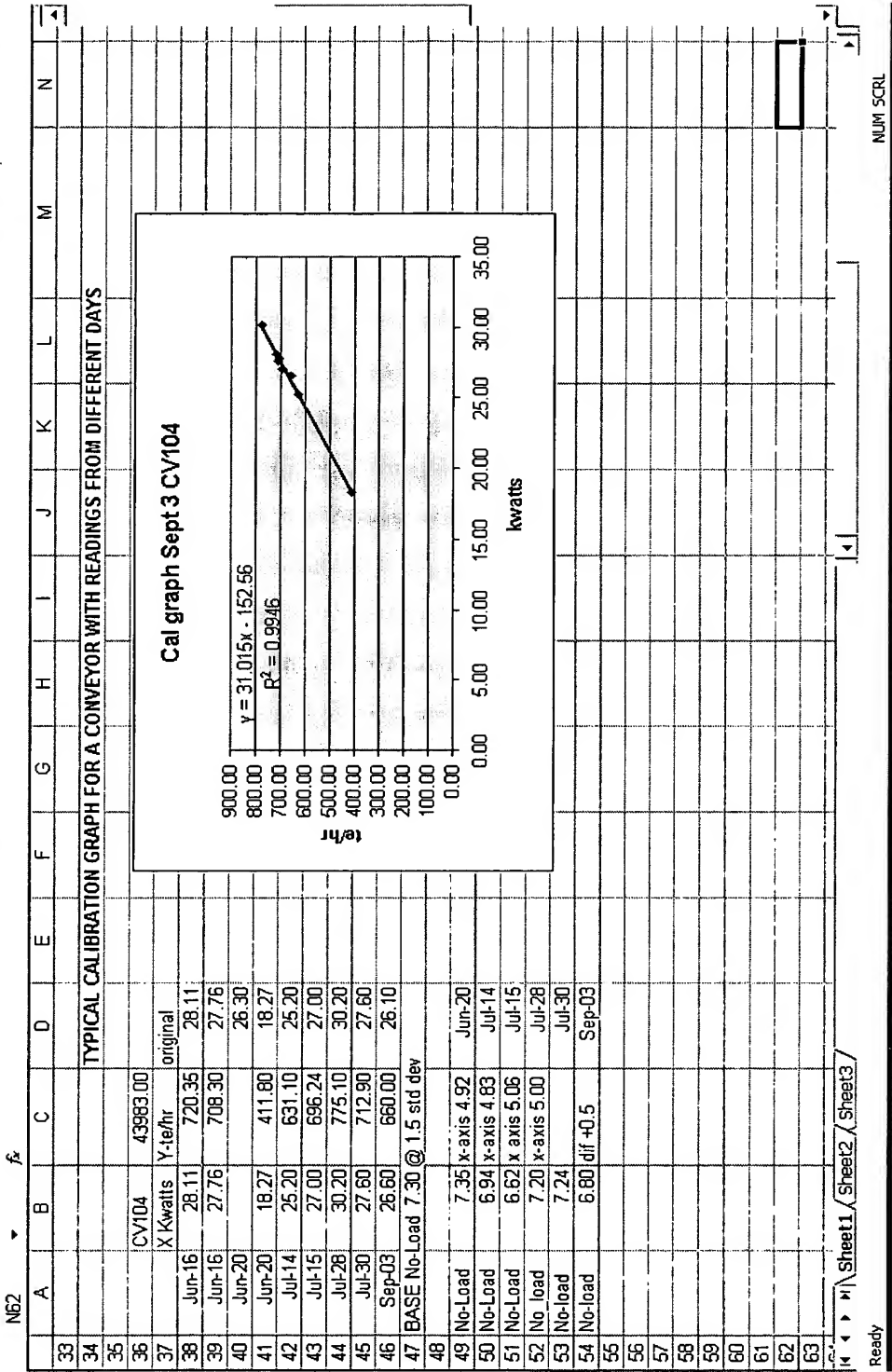


Figure 13c

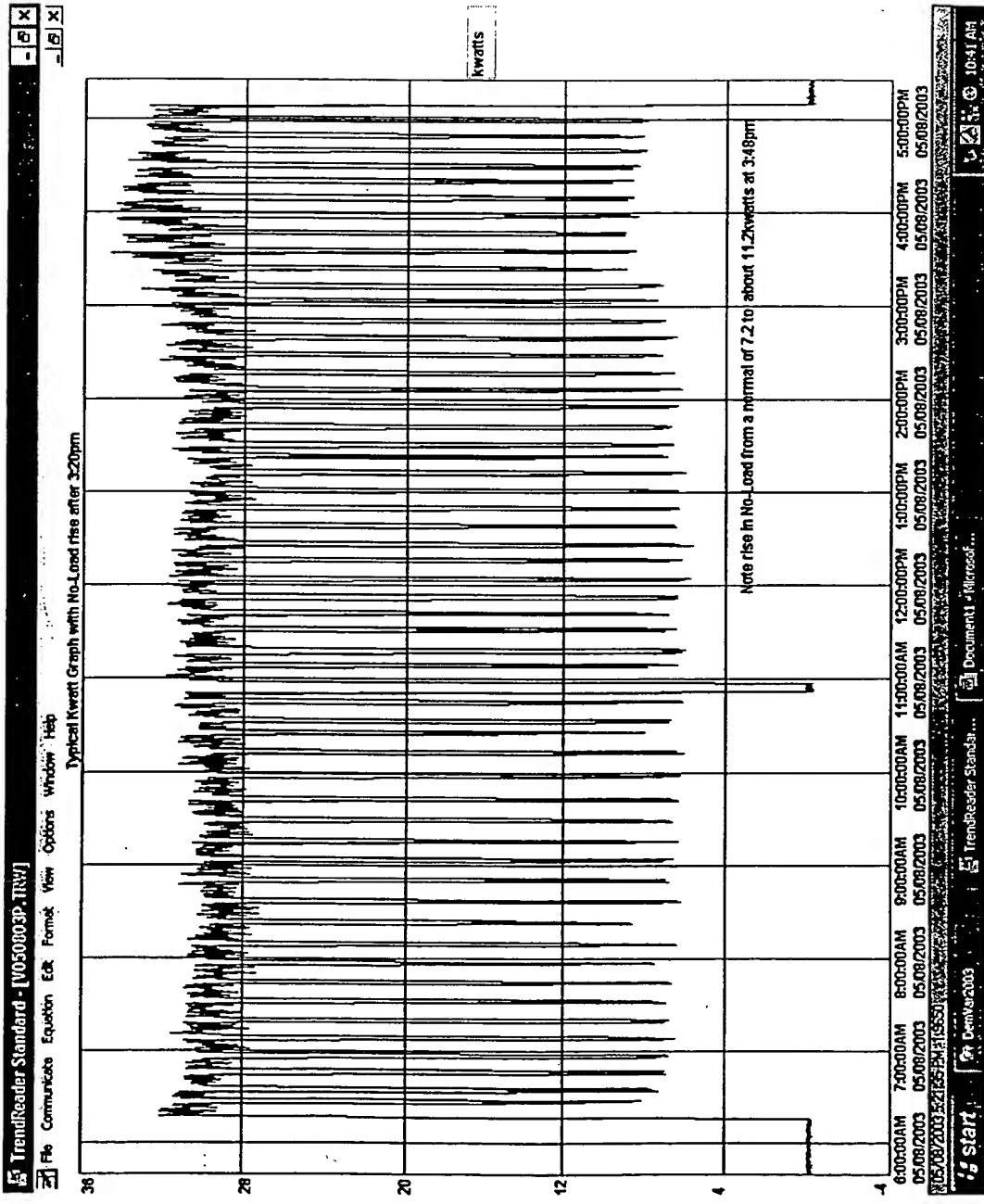


FIGURE 13d Typical Kilowatt Graph showing effect of change in No-Load caused by Friction on return side of Conveyor

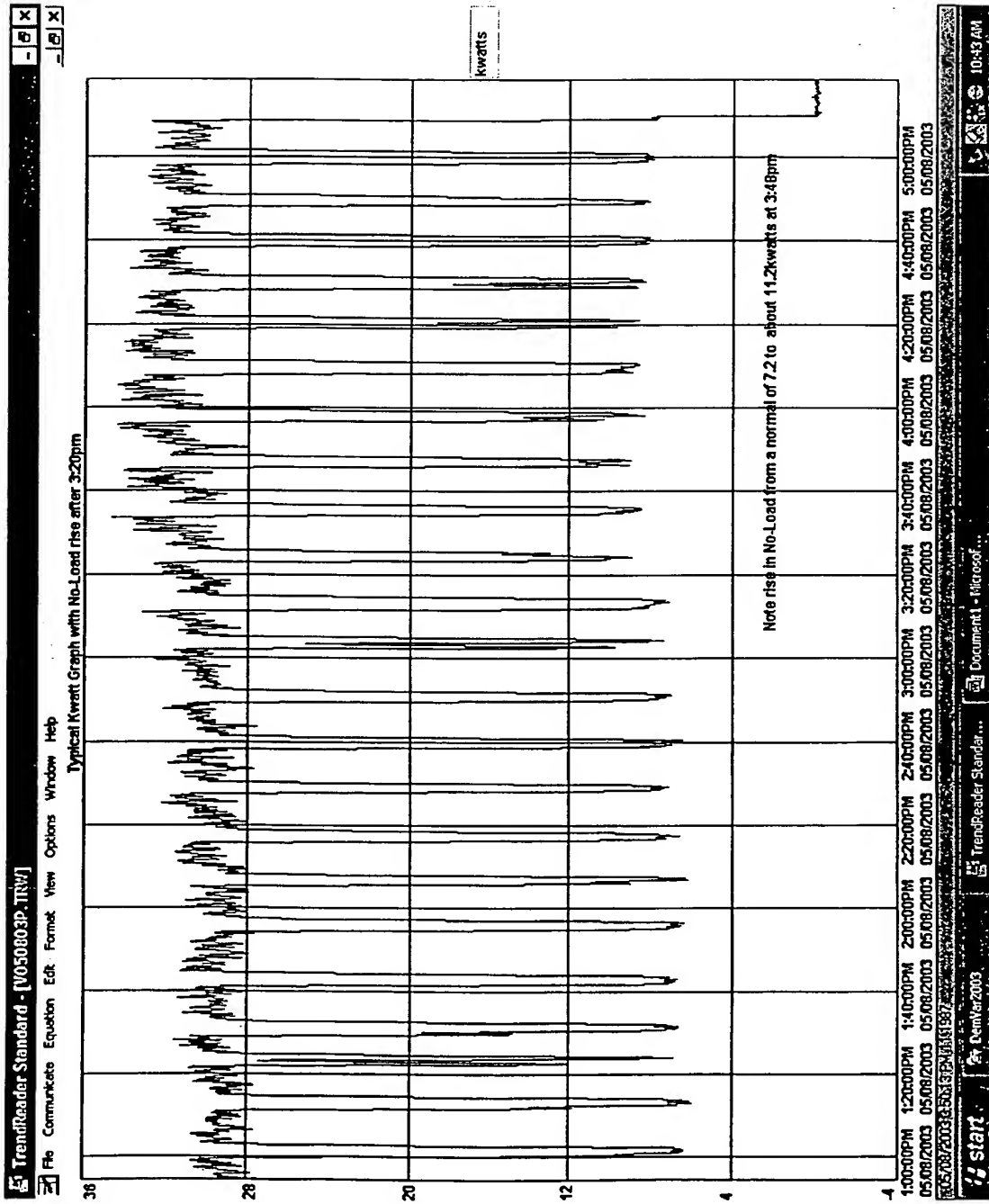


Figure 13e Enlarged view of change in No-Load readings caused by friction on Return Conveyor belt

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Figure 13f Typical Daily summary with No-Load Adjustment												
1	Calibration Formulas											
2	601.908 Ideal Formula Number											
3	639.613 Aug-18											
4	683.630 Sep-15											
5	706.915 Jun 20 03											
6	currently used											
7												
8												
9												
10												
11												
12												
13												
14												
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No load kwatt		Motor	10.834 kwatts
Peak kwatts		97.867 minutes	35.000 kwatts
Time No-Load kwatt		1.631 heures	
Time Start-Up kwatts		0.000 minutes	
Total Production time		10.89 hours	9.259 heures
Average kwatt for day		Motor	28.189 kwatts
Average Tonnage by formula		599.534 t/hre	New No-Load reading
Tonnage by belt scale		5573.000 tonnes est	No-Load Original reading
Total tonnage by GT analyzer =		5551.023 tonnes	599.534 New Formula
Difference		21.977 tonnes	7 300 kwatts
Percentage difference		0.394 %	10.834 kwatts
Time of data		tonnes/hr on conveyor	-3.534 kwatts difference
Reading		Count	
17 05/08/2003 6:16:26	-0.07618	1	
18 05/08/2003 6:16:34	10.84231	0	
19 05/08/2003 6:16:42	12.55725	0	
20 05/08/2003 6:16:50	14.48180	0	
21 05/08/2003 6:16:58	17.18760	0	
Actual kwatt Reading		Count	
17 05/08/2003 17:08:10	32.73644	0	
18 05/08/2003 17:08:18	32.06952	0	
19 05/08/2003 17:08:26	32.83177	0	
20 05/08/2003 17:08:34	29.09691	0	
21 05/08/2003 17:08:42	26.23670	0	
17 05/08/2003 17:08:50	22.02756	0	
18 05/08/2003 17:08:58	15.75908	0	
19 05/08/2003 17:09:06	11.45207	0	
20 05/08/2003 17:09:14	11.45207	1	
21 05/08/2003 17:09:22	11.45207	1	
17 05/08/2003 17:09:30	11.45207	1	
18 05/08/2003 17:09:38	8.07934	1	
19 05/08/2003 17:09:46	7.65013	1	
20 05/08/2003 17:09:54	7.77446	1	
21 05/08/2003 17:10:02	10.00044	1	
4920			
4921			
4922			

No-Load Time		No-Load Reading	No-Load Average kv
05/08/2003 15:46:18	0.400	9.92264	0.748 Std dev
05/08/2003 15:46:26	0.515	9.41319	10.834 1.5 std dev
05/08/2003 15:46:34	0.645	10.15633	11.208 2.0 std dev
05/08/2003 15:46:42	0.878	11.26152	
05/08/2003 15:46:50	1.878		
05/08/2003 15:46:58	1.833		
05/08/2003 15:47:06	1.884		
05/08/2003 15:47:14	1.632		
05/08/2003 15:47:22	1.439		
05/08/2003 15:47:30	1.155		
05/08/2003 15:47:38	0.732		
05/08/2003 15:47:46	0.441		
05/08/2003 15:47:54			
05/08/2003 15:48:02			
05/08/2003 15:48:10			
05/08/2003 15:48:18			
05/08/2003 15:48:26			
05/08/2003 15:48:34			
05/08/2003 15:48:42			
05/08/2003 15:48:50			
05/08/2003 15:48:58			
05/08/2003 15:49:06			
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05/08/2003 15:49:22			
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05/08/2003 15:49:38			
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05/08/2003 15:56:10			
05/08/2003 15:56:18			
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05/08/2003 16:17:54			
05/08/2003 16:18:02			
05/08/2003 16:18:10			

Figure 13f Daily Summary Showing Impact of No-Load Adjustment due to dirt build up at 3:20pm



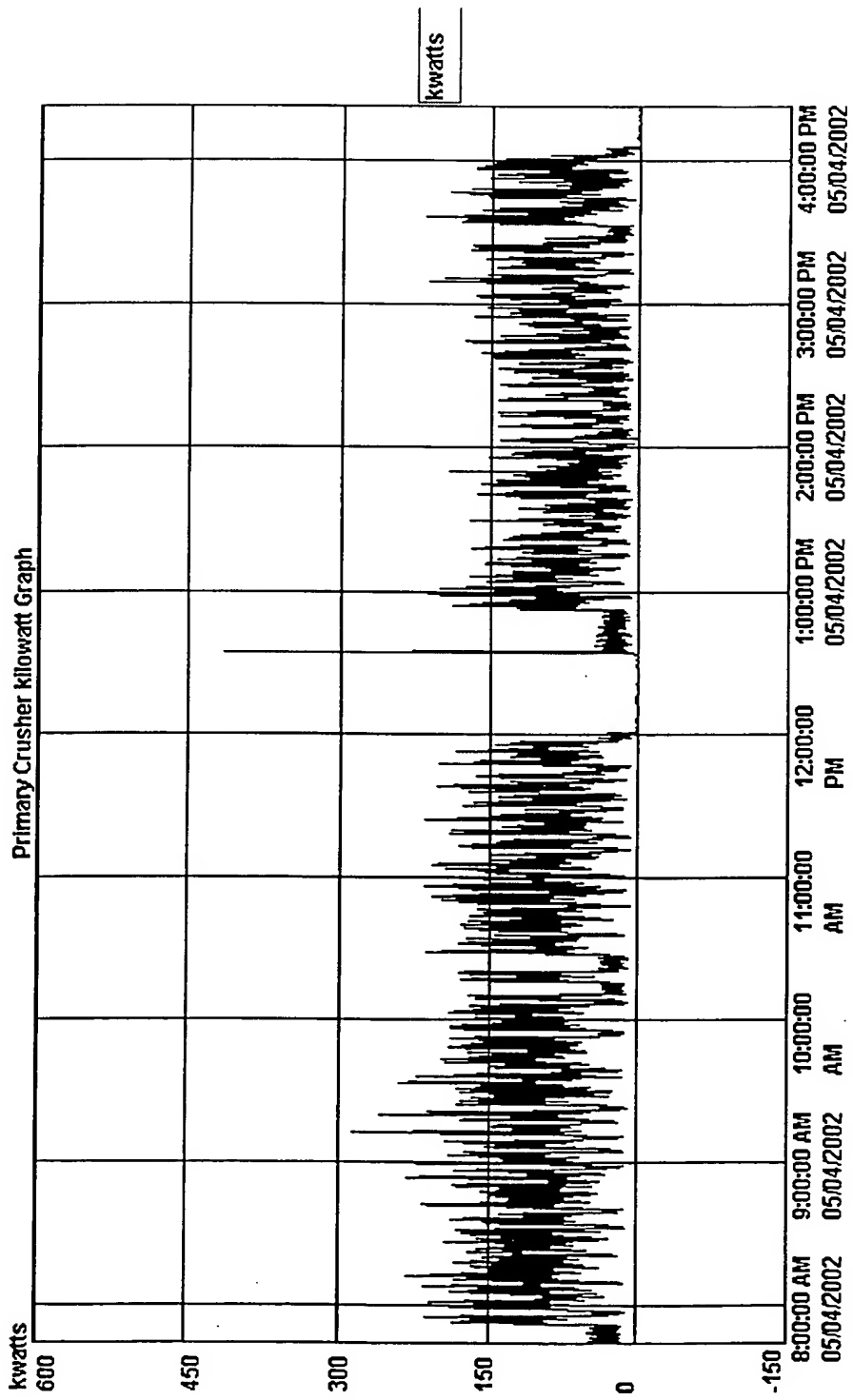


Figure 14: Typical Primary Crusher Graph

## FIGURE 15

### Typical Primary Crusher kwatt report

No load kwatt =	30.000 kwatts			
Start up kwatts =	410.000 kwatts			
Time No-Load kwatt	144.400 minutes	2.407 hours		
Time Start-Up kwatts	0.133 minutes	0.002 hours		
Total production time 10 hrs 23 min	10.383 hours	7.974 hours actual		
Total tonnes on Primary Conveyor Belt Scale		7713.0 tonnes		
Average kwatt for day		91.785		
Total kwatts crushing		731.906 kwatts		
Total te/kwatt crushed		10.538 te/kwatt		
	Actual Kwatt	Count	Count	Conditioned
Time of data Reading	Reading	No-Load	Over-load	kwatt
05/04/2002 7:24:33	0.811	1	0	
05/04/2002 7:24:41	4.358	1	0	
05/04/2002 7:24:49	1.520	1	0	
05/04/2002 7:24:57	0.811	1	0	
05/04/2002 7:25:05	0.811	1	0	
05/04/2002 7:25:13	2.027	1	0	
05/04/2002 7:25:21	2.939	1	0	
05/04/2002 7:25:29	3.851	1	0	
05/04/2002 7:25:37	2.230	1	0	
05/04/2002 7:25:45	3.243	1	0	
05/04/2002 7:25:53	1.317	1	0	
05/04/2002 7:26:01	2.331	1	0	
05/04/2002 7:26:09	2.939	1	0	
05/04/2002 7:26:17	1.013	1	0	
05/04/2002 7:26:25	0.811	1	0	
05/04/2002 7:26:33	1.926	1	0	
05/04/2002 7:26:41	2.534	1	0	
05/04/2002 7:26:49	1.115	1	0	
05/04/2002 7:26:57	0.811	1	0	
05/04/2002 7:27:05	0.811	1	0	
05/04/2002 7:27:13	0.811	1	0	
05/04/2002 7:27:21	0.811	1	0	
05/04/2002 7:27:29	4.155	1	0	
05/04/2002 7:27:37	0.709	1	0	
05/04/2002 7:27:45	0.811	1	0	
05/04/2002 7:27:53	0.811	1	0	
05/04/2002 7:28:01	0.709	1	0	
05/04/2002 7:28:09	0.709	1	0	
05/04/2002 7:28:17	3.952	1	0	
05/04/2002 7:28:25	2.736	1	0	
05/04/2002 7:28:33	0.811	1	0	
05/04/2002 7:28:41	389.056	0	0	389.056
05/04/2002 7:28:49	53.306	0	0	53.306
05/04/2002 7:28:57	55.739	0	0	55.739
05/04/2002 7:29:05	51.178	0	0	51.178
05/04/2002 7:29:13	41.247	0	0	41.247

### TYPICAL QUARRY Kwatts Tonnage report With TEMPERATURE Effect

[illegible]

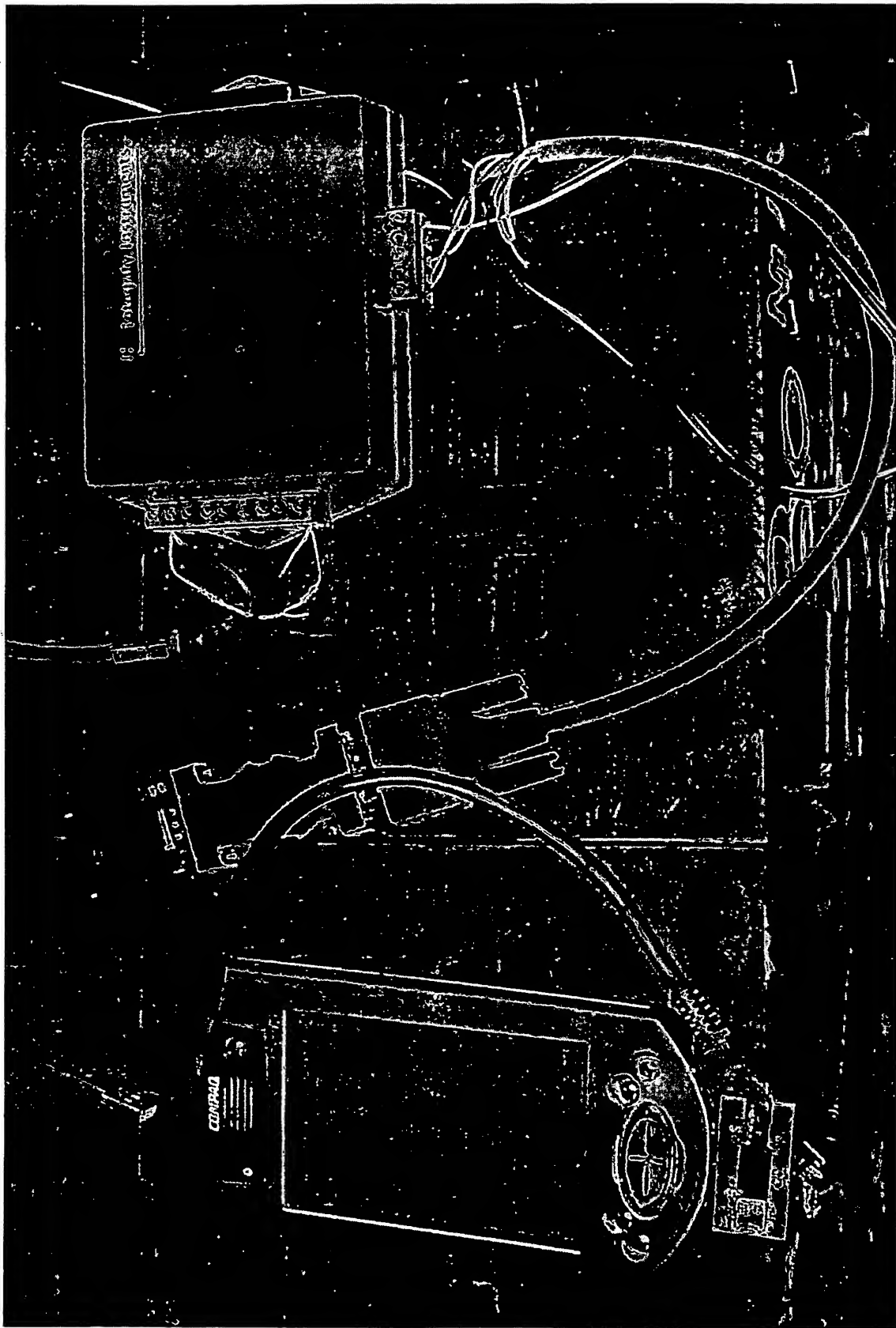


Figure 21

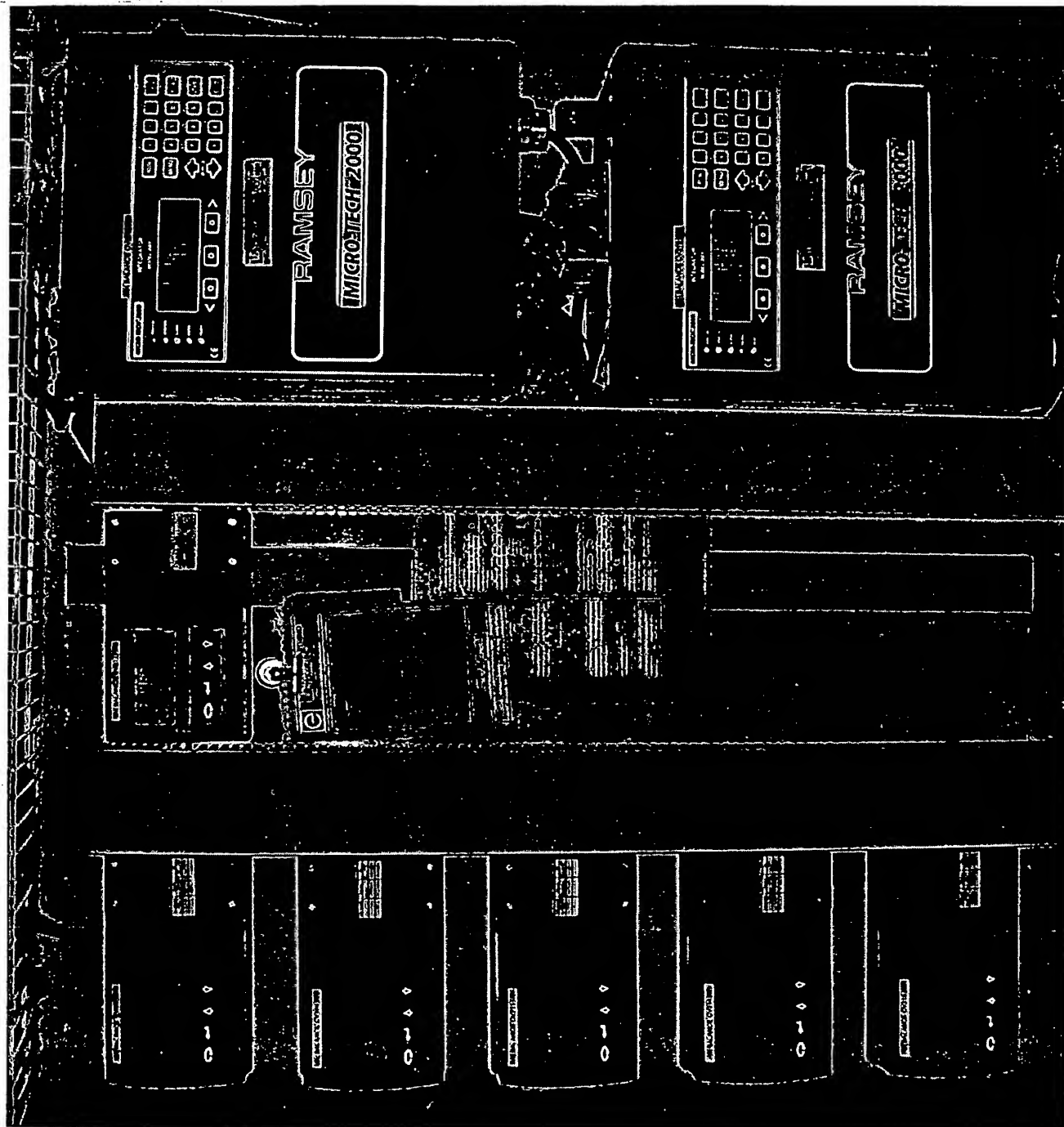


Figure 16a

# Glowe-Tech Tonnage Analyzer

- Real Time Program showing total tonnage, tph, production time, and No-Load time values



Figure 17



# Glowe-Tech Tonnage Analyzer

- Zero test activated as shown in Red

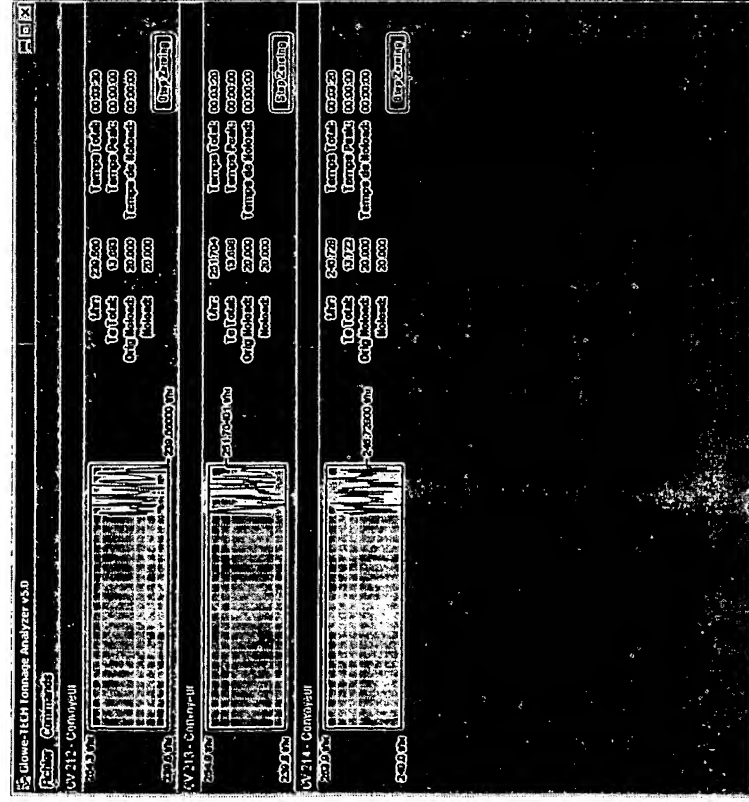
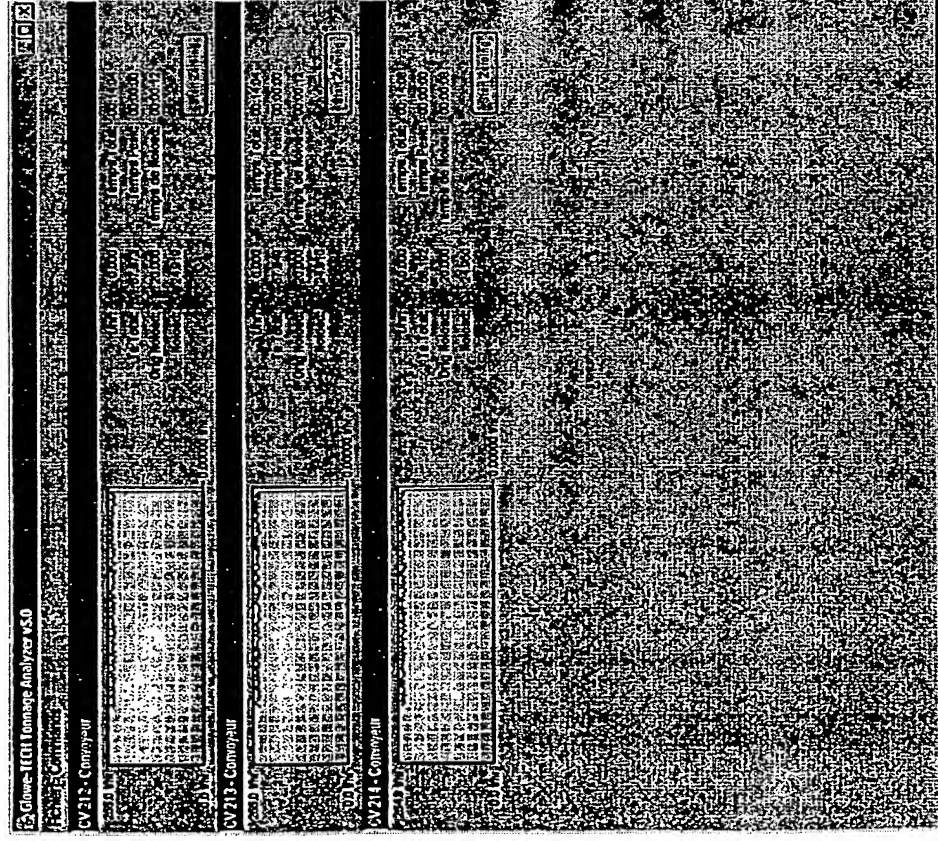


Figure 19

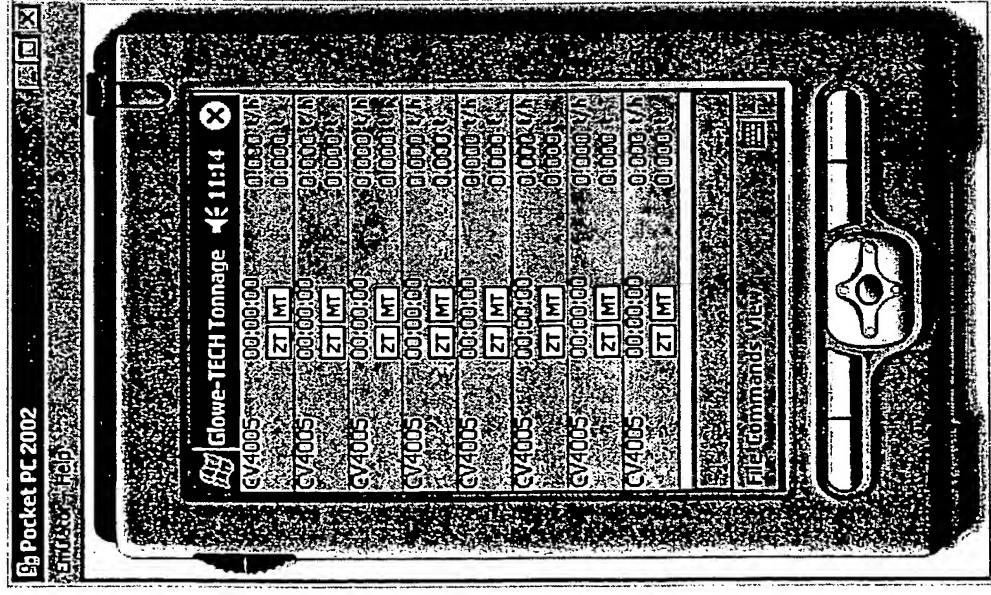
# Glowe-Tech Tonnage Analyzer

- Zero test completed and program re-calibrated



# Glowe-Tech Tonnage Analyzer

- Startup showing 8 channels of data display for crusher or conveyors in Real Time mode



# Glowe-Tech Tonnage Analyzer

- Running with tonnage values totalized and shown as tph, updated every second.

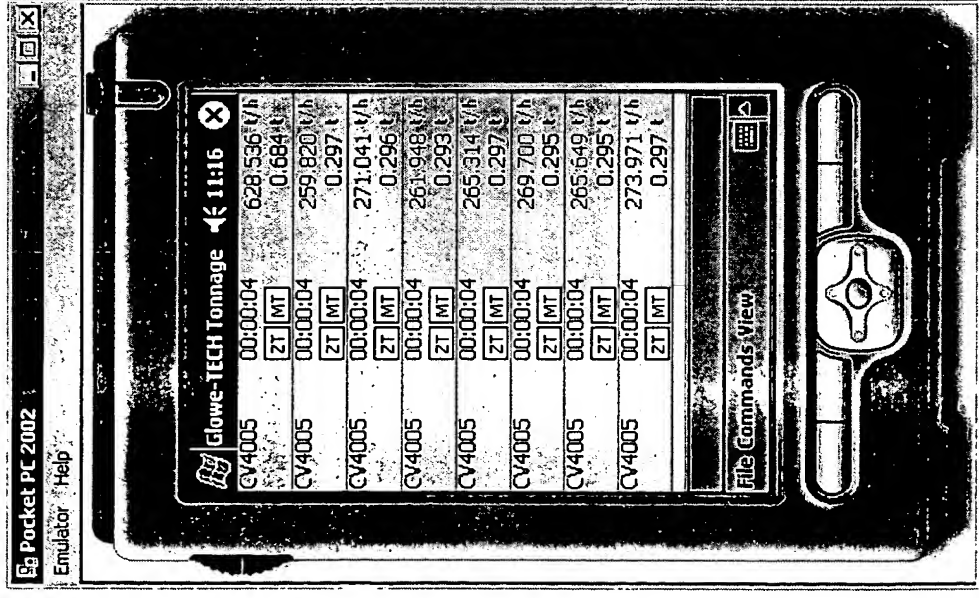
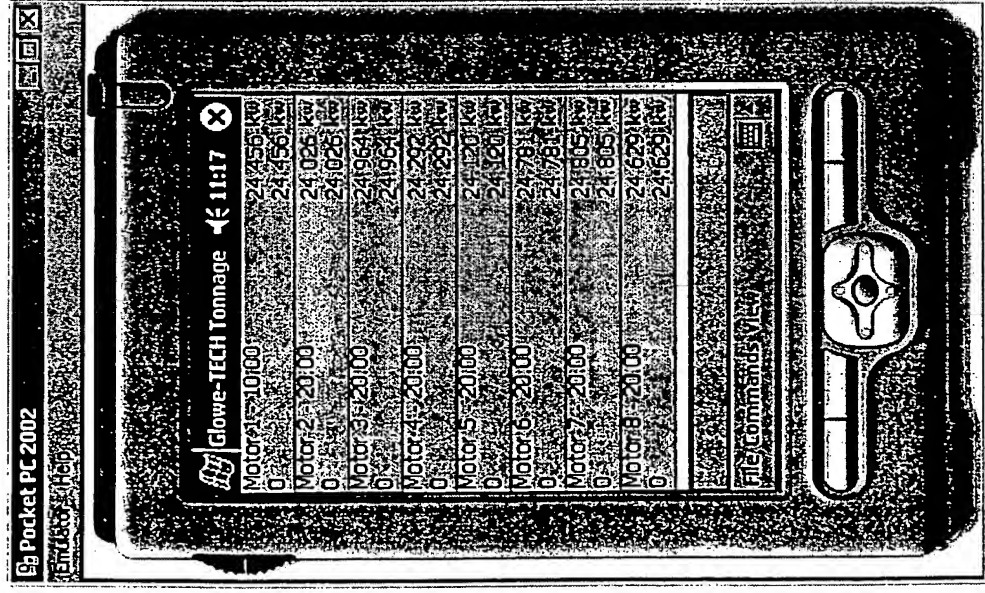


Figure 22

# Glowe-Tech Tonnage Analyzer

- Crusher or conveyor Motor view with kwatt values displayed prior to Zero Test.



# Glowe-Tech Tonnage Analyzer

- Motor view with kwatt values and a zero test in progress for motors 1, 3, and 6

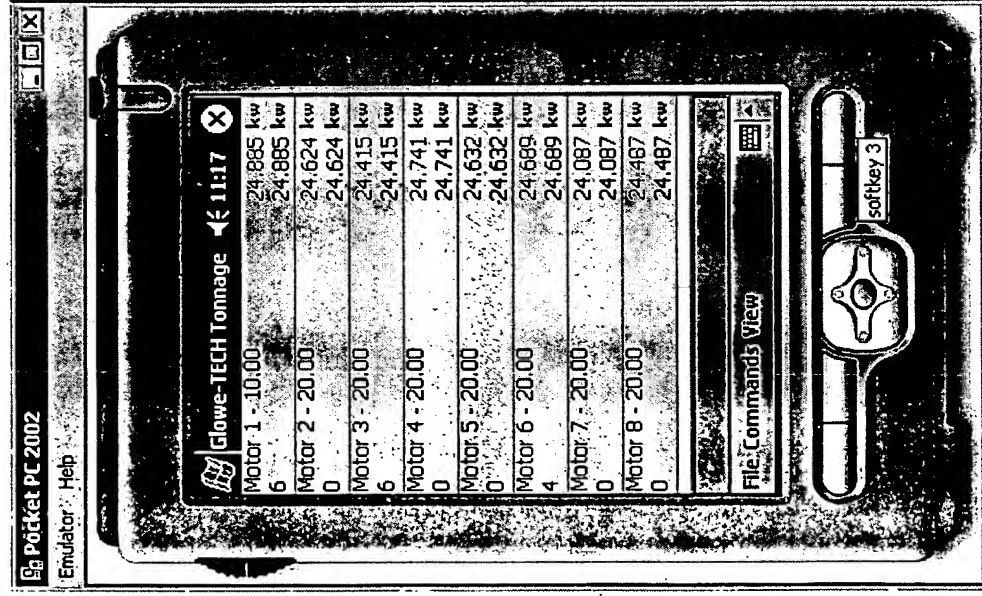


Figure 23



# Glowe-Tech Tonnage Analyzer

- Motor view with kwatt values and finished zero tests with new No-load values for motors 1, 3, and 6

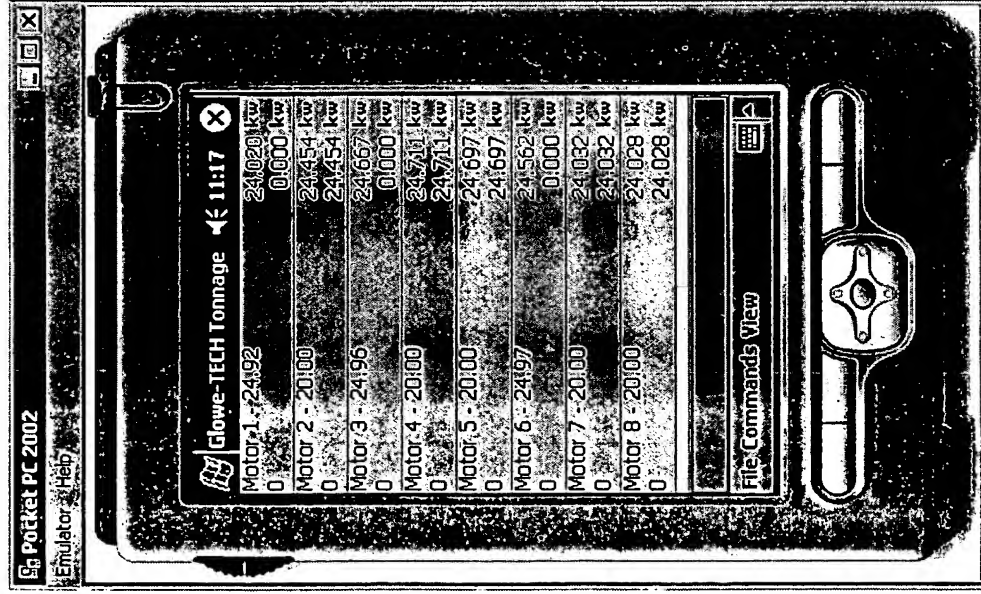


Figure 24

# Glowe-Tech Tonnage Analyzer

- Program startup with graphic display of last 20 minutes of data in Real Time.

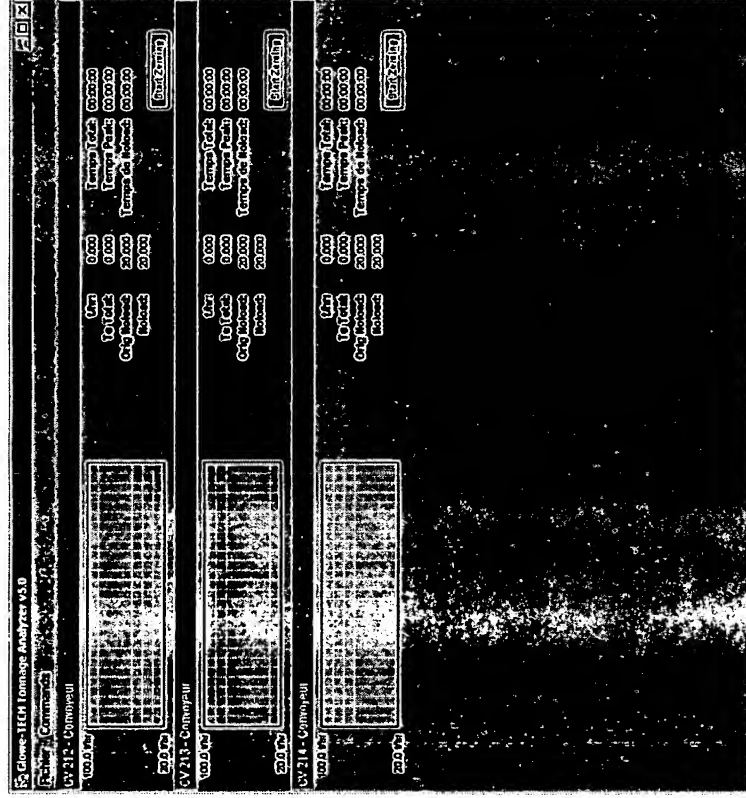


Figure 20

# Glowe-Tech Tonnage Analyzer

- Daily Summary Report including Total tonnage, Production time, No-Load time and new No-load calibration value.

110903 124325.txt - Notepad

File Edit Format Help

Start 11/09/03 12:27:28  
End 11/09/03 12:43:22

11/09/03

Nom	Te Total	Temps de Production	Temps de NoLoad	NoLoad
CV 212	58.26376	00:14:12	00:01:40	24.91902
CV 213	57.84868	00:14:04	00:01:48	24.90978
CV 214	58.58227	00:14:16	00:01:36	24.95023

Figure 25

# Glowe-Tech Tonnage Analyzer

- Screen showing raw data input coming from Data logger with values updated every 1 second with Analog Data Logger and every 4 seconds with ACR Data logger.

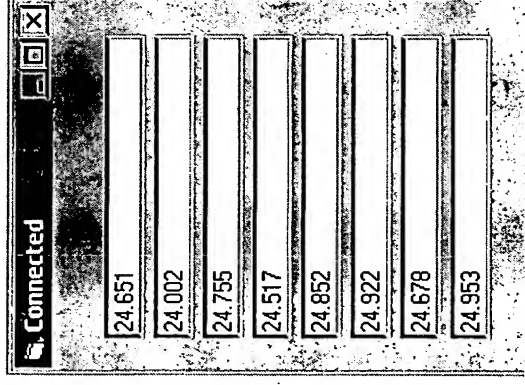


Figure 18

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